Lime Kiln Near Morrison
0.3 Miles North of Junction
Colorado 8 and Rooney Road
Morrison Vicinity
Jefferson County
Colorado

HAER No. CO-11

PHOTOGRAPHS

HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Rocky Mountain Regional Office
Department of the Interior
P.O. Box 25287
Denver, CO. 80225

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HISTORIC AMERICAN ENGINEERING RECORD
LIME KILN NEAR MORRISON

Location: 0.3 Miles North of Junction Colorado 8 and Rooney Road, Jefferson County, Colorado.

UTM:
A. 13/485720 4389360
B. 13/485660 4389280
C. 13/485700 4389260
D. 13/485760 4389340
Quad: Morrison, Colorado

Date of Construction: circa 1878

Present Owner: Spruce Investment Company
6630 East Hampden
Denver, Colorado 80222

Present Use: Abandoned

Significance: The Lime Kiln near Morrison is an intact structure associated with the late nineteenth century lime burning industry which played a brief, but important, role in the early development of Morrison, Colorado and the surrounding area.

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Colorado Department of Highways
November, 1983

Introduction:

The Lime Kiln near Morrison is located 0.3 miles north of the Junction of Colorado Route 8 and Rooney Road in Jefferson County, Colorado. The structure is representative of kilns used in the late nineteenth century lime burning industry, a commercial enterprise significant to the development of the Morrison area. The structure is the most intact example of a lime kiln in the foothills near Denver. The Lime Kiln near Morrison has been determined eligible for listing in the National Register of Historic Places under criteria A and C.

The construction of the Centennial Parkway/C-470, a 26-mile, four-lane Roadway with a detached multi-use trail, is proposed in the vicinity of the Lime Kiln. The Federal Highway Administration is the lead agency in this proposed undertaking. The Colorado Department of Highways is the state agency responsible for completing the environmental studies and preliminary project engineering.

In compliance with section 800.3 of the Advisory Council on Historic Preservation regulations, the effect of the proposed construction upon the kiln was evaluated. Recordation to HAER standards was prescribed.

Historical Background

For a short time before the turn of the century the town of Morrison was a regional center for the lime trade of Denver. By 1874, the year the Denver, South Park and Pacific Railroad reached Morrison, regular shipments of limestone and lime, as well as sandstone, gypsum, coal, and lumber, were being sent to Denver by rail. By 1883, some 50,000 tons of lime were shipped through Morrison annually.[2]

The deliberate burning of limestone to produce lime is almost as old as recorded history. Ancient Egyptians used lime mortar in the Great Pyramids of Gizeh nearly 4,000 years ago. The Romans used lime in the Appian Way and Cato recorded the use of lime kilns in 184 B.C. Other early evidence of the use of lime mortar has been found in Greek architecture, in Mayan and Incan temples, and in the Great Wall of China.[3] In this country, lime plasters and mortars were in use from the earliest of colonial times.

On the Colorado frontier the traditional methods of "burning" native limestone in rock ovens or kilns followed a European technological procedure dating back at least to the year 1440.[4] When limestone is heated to a relatively

high temperature, carbon dioxide is driven out of the stone, leaving calcium oxide or lime as a by-product. This chemical process, known as "calcination," occurs roughly between 900^{o}-1100^{o} Centigrade, depending upon the purity of the limestone.[5] Lime was a valuable product with many significant uses. These included the manufacture of lime mortar and cement for construction, the preparation of agricultural fertilizer, and use as a metallurgical purifier or "flux" in the smelting industry."[6]

The earliest kilns were simply rock-lined pits into which limestone and fuel (usually wood) were thrown. As the fuel burned, the temperature of the limestone was raised to the point of calcination, producing lime. A more controlled burning and a better quality of lime were possible when kilns were built above ground with a lower chamber for burning fuel and an upper chamber for heating the stone. Each load of limestone was carefully hand-stacked in the kiln, roasted for several days, allowed to cool, and unloaded, again by hand. The process was very slow and laborious.[7]

The lime kiln near Morrison appears to be a further refinement of lime burning but still an example of a primitive technology. Known as a "vertical mixed feed kiln," this variety of kiln was loaded from the top with alternating layers of fuel and limestone. Spent fuel and lime were drawn out of the base of the kiln through large oven doors, creating room at the top for additional layers of fuel and stone.[8]

Small kilns of this type were typically built near the source of the limestone to be burned and were used until the limestone supply was exhausted or the need for lime was eliminated (completion of a house for example). The kiln near Morrison was built right beside an outcropping of limestone reported to have been 25 feet thick and 300 feet long. Known as the Garfield Quarry, this was only one of several sources of limestone in the Morrison area.[9]

An exact construction date and the original ownership of the kiln are open to some speculation. The property on which the kiln was built was owned by the Morrison Stone, Lime and Townsite Company, an organization formed in 1872 to develop Morrison.[10] It seems likely that this company, which was a subsidiary of the Denver, South Park

and Pacific, built the kiln for its early lime operations. A chain of title documenting the site's ownership from 1896 to the present is included at the end of this document.

In June of 1874, the DSP&P Railroad reached Morrison and became a rather productive branch line.[11] Building stone, gypsum, coal, lumber, limestone and burned lime were hauled from the foothills to Denver. Morrison also became a popular resort to which regular tourist excursions were run.[12]

In 1878, the railroad added short spur lines to lime quarries at Soda Lakes south of Morrison and to the Garfield Quarry. The Garfield Spur ran along the edge of the Hogback and it is on this alignment that the kiln is located. It seems highly probable from the location of the kiln that it was built shortly before or after the railroad spur was put in.[13]

It appears that the kiln operated for only a few years before it was abandoned. Early photographs of the town of Morrison indicate that two large lime kilns had been built beside the railroad tracks by 1885.[14] It seems unlikely that the small kiln at the Garfield Quarry would have been

used after the two Morrison kilns were ready for operation. This is supported by the size of the ash and waste pile located immediately south of the small kiln. The ash pile extends for about 75 feet but does not appear to be extensive. All lime burning activity appears to have ceased in the Morrison area around 1900 and there are several possible explanations for this. Local historians contend that a shortage of wood fuel made local burning uneconomical. Further pressure to close the kilns may have come from the local and tourist population. One of the consequences of lime burning in the old days was the great clouds of smoke which continuously billowed forth from the tops of the kilns. Still another challenge came from the Portland cement industry which began making significant advances in the United States around 1890. Between 1895 and 1910 the preeminence of lime mortar and plasters suffered severely from the increasing popularity of Portland cement and, later, gypsum plasters. Finally, significant technological advances in the lime burning industry began around 1900 which rendered the primitive stone kilns obsolete.[15] In all probability, a combination of these factors brought about the demise of the local lime burning industry.

On the south wall of the kiln there is a small wood-framed doorway which could not have been there when lime was burned. This apparent incongruity is explained by long-time residents of the area who remember that the stone tower was used as a dynamite "vault" or storage building as early as World War I. Dynamite was used all along the Hogback in small coal mines until the mid-1930s when much of the mining activity in the area ceased. Other kilns in the area were torn down for their building stone or to clear land for development but it appears that the small kiln near Morrison survived because of its reuse as a storage building.[16]

SITE DESCRIPTION

The Lime Kiln near Morrison is a straight stack kiln constructed in coursed sandstone laid in lime mortar. The structure's original pointing has been patched with Portland cement over the years.

As characteristic of nineteenth century lime kilns, the structure is sited into the slope of a hill to facilitate loading from the top of the stack. The exposed elevation rises approximately twenty feet from a square base

measuring approximately fourteen feet to a square, open top measuring approximately twelve feet. The exterior corners of the kiln are braced by vertical, steel rods which are secured to the structure by steel brackets. The corner rods are reinforced by horizontal steel rods on the upper levels of the elevations.

Evidence of arched openings survive at the base of the north and south elevations. The north elevation bay is most intact and includes evidence of an original brick lining. The south elevation bay has been altered (circa 1920) to accommodate a rectangular entry bay. The entrance is supported by a rough board frame. This modification most likely dates to the structure's conversion to a dynamite storage shed. The interior of the structure is circular in plan and measures approximately eight feet in diameter. Evidence of an original, parged, fire brick lining can be found on the structure's interior. The kiln is partially filled with stone and brick debris and modern trash.

Evidence of the kiln ash heap survives approximately fifteen feet south of the structure. Broken fire brick and limestone fragments can be found to the south and west of the kiln.

The kiln may well be the last remaining structure of its type in the Morrison area. Although it has been modified slightly through reuse and deterioration it retains its original shape and basic appearance. The physical setting has been changed only slightly by erosion and native limestone can still be found fifty feet to the west of the structure.

The lime kiln near Morrison survives as a representative example of the late nineteenth century lime burning industry which played a brief, but significant, role in the early development of Morrison and of the surrounding area. The structure embodies the distinctive characteristics of type, period and method of construction.

CHAIN OF TITLE:

Original and subsequent owners: References to the chain of title to the land upon which the structure stands are in the Office of the Clerk and Recorder of Jefferson County, Golden, Colorado. (Patent excepted.)

1896 Patent. Recorded February 27, 1896 at the Colorado Land Commission. State of Colorado to the Morrison Stone, Lime and Fluxing Co. 80 acres.

1919 Special Warranty Deed. Recorded August 7, 1919 at Book 212, Page 231. Eliza C. Garfield, Earl F. Perry and Floyd L. Perry, as sole surviving directors of the Morrison Stone, Lime and Fluxing Company, a defunct corporation, to Eliza P. Garfield and Caroline G. Perry. 240 acres.

1925 Quit Claim Deed. Recorded November 20, 1925 at Book 275, Page 546. Eliza C. Garfield to Caroline G. Perry. 320 acres.

1940 Special Warranty Deed. Recorded November 6, 1940 at Book 430, Page 509. A.E. Perry, Sr. to Perry Investment Co. Approximately 240 acres.

1942 Warranty Deed. Recorded May 15, 1942 at Book 456, Page 209. Perry Investment Company to Leland C. Cox. 240 acres.

1972 Warranty Deed. Recorded July 17, 1972 at Book 2398, Page 548. Leland C. Cox to DeMonaco, Ltd. 19 . 5195 acres.

1972 Warranty Deed. Recorded July 17, 1972 at Book 2398, Page 500. Leland C. Cox to DeMonaco, Ltd. 4.293 acres.

1972 Quit Claim Deed. Recorded July 17, 1972 at Book 2398, Page 558. Leland C. Cox to DeMonaco, Ltd. 0.1584 acres.

1980 Warranty Deed. Recorded March 6, 1980 at Reception No. 80017868. DeMonaco, Ltd. to Spruce Investment Company. Approximately 17.93 acres.

ENDNOTES

[1]Local area residents recall that there were at least three kilns in the foothills and two more within the town of Morrison at one time. Only one now remains. A recent inventory of historic sites in Boulder County identified three ruins of kilns but none were as complete as the one near Morrison. (See footnote 9).

[2]M.C. Poor, Denver, South Park & Pacific. (Denver: The Rocky Mountain Railroad Club, 1949) p. 125. "Morrison's Mission," The Rocky Mountain News, January 1, 1884, p. 9, c. 4.

[3]Robert S. Boynton, Chemistry and Technology of Lime and Limestone, (New York: Interscience Publishers, John Wiley and Sons, 1966) pp. 3-4.

[4]F.J. North, Limestones: Their Origins, Distribution, and Uses, (London: Thomas Murby and Co., 1930, p. 388).

[5]Alfred B. Searle, Limestone and Its Products. (London: Ernest Benn Limited, 1935, pp. 279) pp. 404-409. Technically, calcination is "the thermal decomposition (of limestone) in which coproducts, lime and carbon dioxide, are formed." (Robert S. Boynton, op. cit., p. 132).

[6]Robert S. Boynton, op. cit., p. 340 and Figure 11-1. According to Boynton, "there is no other material in commerce that has a greater myriad of diverse uses and varied functions . . . as lime; its uses are almost countless . . . ." (p. 340).

[7]F.J. North, op. cit., pp. 387-88, 394.

[8]Robert S. Boynton, op. cit., p. 205. The process used in the vertical kilns greatly increased production over the intermittent pit kilns. Intermittent kilns could also be built as above ground structures lacking the continuous feed process.

[9]Thomas Pike, several interviews conducted by the Colorado Department of Highways staff in 1978. Alexander Rooney, interview, November 4, 1981. Mr. Rooney and Mr. Pike are longtime residents of the area east of Morrison along the Hogback. Both men recall a number of limestone quarries and at least three kilns in the vicinity of the lone remaining kiln.

The geology of the foothills zone of the front range of the Rockies is characterized by a series of upturned ridges extending from Pike's Peak in the south to Long's Peak in the north. These ridges are composed in part of Dakota sandstones, Benton shales, Niobrara limestones, and various clays. Layers of limestone of differing quality and thickness are found throughout the Benton and Niobrara formations, and wherever they were exposed and accessible, it is likely that they were quarried. (Arthur Lakes, "Sketch of the Economic Resources of the Foothills of the Front Range of Colorado," in The Mining Reporter, Vol. L1, No. 21 (May 25, 1905) pp. 522-524.

[10]W.C. Willet, "Willet's Farm Map," Denver, 1899; M.C. Poor, op. cit., p. 114.

[11]Robert M. Ormes, Railroads and the Rockies: A Record of Lines in and Near Colorado, (Denver: Sage Books, 1963) pp. 232-235. When the DSP&P was first organized, its promoters envisioned a narrow gauge line stretching from Denver to Yuma, Arizona and a junction there with the Southern Pacific. Originally the line was to have been run through Morrison and up Bear Creek Canyon into South Park. By 1874 a better alignment up the Platte Canyon road was completed into South Park and the Morrison track became a branch of the main line.

[12]M.C. Poor, op. cit., p. 129.

[13]No visible traces of the abndoned railroad grade are visible in the immediate vicinity of the kiln. During World War I the spur was extended nearly two miles north to reach the Satanic Coal Mine (later called the Bluebird 1) on the Rooney Ranch. In the vicinity of the coal mine, the old rail bed is still evident. The spur was abandoned and the tracks were taken up shortly after the end of the war. (Alexander Rooney, interview, November 4, 1981. M.C. Poor, op. cit., p. 131).

[14]Sam Arnold, The View from Mt. Morrison, (Denver: The Fur Press, 1974), p. 15 and several photographs. Alexander Rooney recalls riding past the Garfield Quarry on horseback around 1908 or 1910. At that time the quarry was still being worked but the kiln was not being used. (Interview, November 4, 1981).

[15]Mrs. Lorraine Horton, interview, October 14, 1981. Victor J. Azbe, The Theory and Practice of Lime Manufacture, (Clayton, MO.: Azbe Engineering Corporation, 1946) pp. 118-119. Robert S. Boynton, op. cit., pp. 388-389. Arnold, op. cit. pp. 204-205.

[16]Alexander Rooney, op. cit. Albert Rooney, interview, November 3, 1981. Albert is the eldest son of Alex Rooney and grew up on his father's ranch. Thomas Pike, op. cit.

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